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Trade Openness and Economic Growth in East African Community (EAC) Member Countries

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Abstract
This paper applies the Dynamic Ordinary Least Squares (DOLS) technique to panel data from1990 to 2015 to provide empirical evidence on the long run relationship between trade openness and economic growth in for the East African (EAC) member countries. The paper find negative relationship between tarde openness and economic growth but statistical significant at 5%. The granger causality test results have shown the existence of a unidirectional causality freom from economic growth to trade oppeness.
Keywords: Trade Openness; Economic Growth; DOLS; Granger Causality

1. Introduction

In the international trade, trade openness is assumed to play central role in promoting economic growth for both developed and developing countries. It is an important to the countries since is the source of foreign direct investment and reduce balance of payment and mobilize the internal resource by creation of employment opportunities. Moreover, the effect of trade is to increase competition and enhances efficiency (Ray, 2012).

The impact of trade openness on economic growth has been a topic of intense discussion in both empirical and theoretical studies. Most studies have discusses this aspect on the framework by using both time series data and panel data. Despite the enormous number of studies, controversy still exists on whether trade openness stimulates economic growth of least developed countries. Studies that argue that theoretical and empirical relationship of openness effects economic growth provide mixed results. Some studies indicate positive relationship between openness and economic growth through stimulating investment, technological enhancement, attracting FDI and hence, promoting economic growth (Arif and Ahmed, 2012; Sakyi at el, 2012; Zeren and Ari, 2013; Nowbutsing, 2014; Adhikar, 2015). However, some other studies have indeed gone to the extent of condemning trade openness as being among the factors that contribute to poor economic performance in the countries (Kim, 2011; Kali at el, 2007; Hallak and Levinsohn, 2004). These inconclusive pattern between trade openness and economic growth relation necessitate further work to be carried out in order to clarify the impact of trade openness on economic growth in developing countries.

Similarly, empirically, there are few study is related on trade openness and economic growth in African, most of them used multivariate variables including FDI, institutions, export, technology that was related on trade openness and economic growth (Matthew, and Adegboye, 2014; Seetanah et al, 2012). Yet, there is no study that has focused on economic region in African countries related on bilateral trade openness and economic growth. Thus, this study intends to fill the gap by exploring EAC which have not been investigated previously. This study finds out the impact of trade openness on economic growth of EAC selected countries that the period covered for the empirical analysis is from 1990 until 2015. Meanwhile the sample countries for this study are East African community countries namely United Republic of Tanzania, Kenya, Uganda and Rwanda. The results reveals satisfactory evidence that there is a negative relationship between trade openness and economic growth for the EAC countries. Moreover, the empirical results show there is a unidirectional causality relationship between trade openness and Economic growth in EAC countries.

The rest of the paper is organized as follows. Section two contains literature review which discussed on theoretical foundation and empirical evidence about trade openness and economic growth; section three presents the econometrics and methodology used; section four presents the empirical findings of the study and discussion; and section five presents the summary and conclusion.

2. Review of Literature

The theoretical connection between trade openness and economic growth has long been established in the classical economic theory originated from economist David Ricardo (1917), who extended the idea of Adam Smith (1776) about the flow of good from one country to another. The earliest concept attempts to describe the function of international trade within that highly nationalistic body of thought now known as mercantilism. Mercantilism is the economic system during the 16th to 18th century. It focuses on maximizing exports and limit import in order to bring “specie” (precious metals) into the country. However, this theory improve favorable balance of payment through limiting import but failed to explain potential for mutually beneficial trade, free trade and markets rather than shunning it since no country can export alone without importing. Likewise, export-led growth strategy can be seen as next mercantilist thoughts because it encourages ability of the nation to export more. This mercantilist idea can help many developing counties attempt to modernize their societies and

improve social welfare.

In modern economic arena, the framework of export-led growth hypothesis tries to describe the importance of export-growth in the economy. After success story of East Asian export-led growth strategies adopted during the period of 1970s and 1980s, this model gained more attention. However, the export-led growth hypothesis became especially popular after the failure of import substitution strategy implemented by most African and Latin American countries. Mohamed at el, (2012). Meanwhile, export-led growth strategy facilitates trade activities which have linkage with other productive sector. Thus, trade act as is an engine of economic growth in the sense that can contribute to the allocation of resources within countries as well as transmit growth across countries and regions because it increases the total factor productivity (TFP) of local firms resulted from increased economies of scale.

Smith (1776), contradicted mercantilist ideas whereby he claimed that it is impossible for all nations to be rich concurrently by following mercantilist ideas because exports of one nation is another nation's import. He propounded the theory of absolute advantage whereby if countries practiced free trade and specialized in goods that they had absolute advantage all countries would benefit. Since Adam Smith with his absolute advantage failed to explain trade gain that country can realize, David Ricardo (1917) came with a theory of comparative advantage to explain the gains that arise from trade which has indulged many countries to trade. Lambrechts et al. (2012), supports comparative advantage theory since contribute to the economy and improve technological efficiency on a global scale

In neoclassical models, Solow (1924) and Swan (1956), which examines the convergence of an economy to a growth rate set by exogenous population increase. Solow-Swan generalized to allow for substitution between capital and labor. Moreover, the neo-classical theory assumes productivity improvements as an "exogenous" variable and it is assumed to be independent of capital investment. The Solow model (1957), concludes that growth is exogenously determined. Endogenous growth theory assumes that economic growth is primarily the result of endogenous and not external forces. Endogenous growth theory started with Romer (1986) and Lucas (1988) due to dissatisfaction of neoclassical models treats that technological progress as exogenous.

Several empirical studies support a positive impact of trade openness on economic growth and development. Sakyi et al (2012), investigate the impact of trade openness on economic growth and development of 85 middle-income economies over the period 1970-2009. The study utilizes heterogeneous panel co-integration techniques that are robust in the presence of non-stationarity, endogeneity and cross-section dependence. The study found that there is a significant long-run relationship between trade openness and development. Likewise Königer and Busse (2012), explores the link between trade and growth in 108 countries (of which 87 are developing countries) covering the period 1971-2005 (1970-2005 for the GDP per capita variable) using GMM. They found that trade openness has a positive and highly significant impact on economic growth.

Zeren and Ari (2013), Developed Granger non-causality test in heterogeneous panels to reinvestigate the causality relationship between trade openness and economic growth for the G7 countries between 1970 and 2011. The empirical results show there is a bidirectional causality relationship.. Similarly, Nowbutsing (2014), examined the relationship between openness and economic growth for Indian Ocean Rim Countries in a panel data framework. The panel consists of 15 countries over the time period 1997 to 2011 using the Fully Modified Ordinary Least Square (FMOLS). Ultimately, it is found that the three measures of openness positively affect economic growth.

Adhikar (2015) investigates the linkage between FDI, trade openness, capital formation, human capital, and economic growth rate in Nepal employed the vector error correction (VEC) model using annual time series data over the period 1985-2012. The study revealed that trade openness and FDI have a dynamic positive effect on the GDP per capita growth rate in Nepal.

Some literature supports that trade openness effectively fosters economic growth, only by the improvement of particular policies and sectors or by the existence of specific preconditions. For international trade openness contribution to be strong in developing countries, Rodrik (1997) proposed the accumulation of human capital, physical infrastructures, macroeconomic stability, private sector development and the rule of law.

Kim (2011) claim that trade openness benefits higher income countries more than lower income countries due to low income countries are not able to take advantage of knowledge accumulation and technology spillovers. Likewise Kali et al. (2007), suggest that not only the volume of trade matters, but also the structure of international trade has significant implications for economic growth and development. The study try to emphasize that the importance of structure of international trade (what a national actually exports i.e. either capital goods, manufactured goods, or primary products). On the contrary, there are also some empirical studies which support that trade openness negatively affects economic growth. The more the open economy the more the risk in macroeconomic stability causes nation to be dependent on international demand and this leads to the fluctuations of international markets.

In addition to this, trade openness may cause macroeconomic instability through augmenting inflation, depreciating exchange rates and leading to balance payment crisis ultimately causes negatively affects domestic

investments. Rodrick and Rodriguez (2000), put doubts on the measures on the applied methodology used by Edwards (1998) and the instrumentation strategy employed by Frankel and Romer (1999). It follows that the positive relationship between trade openness and economic growth reported was either due to inappropriate econometric techniques employed or due to the flawed measures of openness used in the their studies. Hallak and Levinsohn (2004)), claim that if researcher includes a geography measure or a measure of institutional quality, then the effect of openness on growth is mitigated and becomes less significant.

The review clearly shows that, however, there are many studies on the issue of trade openness and economic growth, the results are mixed and inconclusive. Likewise, most of the studies focused on either an individual country or a group of countries. Despite the strong theoretical support that growth in trade generates continuous economic growth; many times, the failure of the empirical literature to consistently deliver the same picture is a fact.

3. Econometrics model and Methodology

3.1 Theoretical Framework

Growth theoretical model begin with Solow (1980), the development of the model has three basic components for the GDP, labour (L) capital (k) and technology (A)

$$Y= AK^{\alpha} L^{(1-\alpha)} \quad \text{……………………………………………………………………....1}$$

Romer (1986) and Lucas (1988) argued that Solow model should be extended to include human capital; from their view is that human capital can lead to captivate technology and stimulate the economic growth. The form of the model:

$$Y= K^{\alpha} (AH)^{I-\alpha} \quad \text{……………………………………………………………….. 2}$$

Since, the endogenous growth model allows the additional of other variable, further review related on economic growth incorporate different variable in their model such as, government expenditure, exchange rate, inflation, labour, consumption expenditure, Foreign Aid, corruption, financial development, education, population growth and life expectancy (Anaman; 2004 and Kogid at el; 2010). The model to specification generated from the Cobb Douglas production function model which is formulated as follows:

$$\mathrm{Y}_{it} = \mathrm{A}_{it} \mathrm{K}_{it}^{\alpha} LAB_{it}^{\beta} \quad \text{………………………………………………………………… 3}$$Where

Y_{it} is total output, A_{it} represent total productivity factors, K_{it} represent capital , α is pointed out be output elasticity of capital; and LABit represent labour force , β point out to be the output elasticity of labour force .

Also the equation (1) can be expressed as:

Y=f (K, LAB, A)

From the second equation A refers to as total productivity factors, it is observed that the factors have effects to the output through the technological implementation.

Since, total productivity factor has an impact in total output (GDP) and depends on technology and efficiency to raise the output growth. This mean that the impact of Foreign direct invest (FDI) toward economic growth can be possible operated through total productivity factor via the transfer of technology to the host country (Fosu and Magus, 2006). However, the transfer of the technology will take place through trade openness. Since, the objective of the study is to analyse the impact of trade openness on economic growth; therefore, it is assumed that trade openness (TRD) are the function of total productivity factors .The equation (3) can be transformed as follow:

Ait=f(K,SCH,FDI,TRD)

Therefore, from the equation (3) specify the model for the estimation of trade openness impact toward economic growth through the production function, by taking GDP as the dependent variable and TRD, FDI, SCH and K as the independent variables. The model can be formulated as follows:

LGDPit =D+β1LKit+β2LSCHit+β3 LTRDit+β4 LFDIit+εit

3.2 Empirical Methodology

To estimate Dynamic ordinary least square, panel Cointegration technique is used, which consist the following steps: -

3.2.1 Panel Unit Root

The study uses unit root test to check the stationarity of the time series. Panel data unit root tests have been used in accordance with recent literature to adjust the difference in mean and variance within a variable. Since the data is collected over a large span of time it is possible that a unit root problem would occur. There are various tests that can be used to identify a unit root problem in panel data, namely those of Maddala and Wu (MW) (1999), I'm, Pesaran and Shin (IPS) (2003); Levin, Lin and Chu (LLC) (2002) and Hadri's (2000). In this study, two tests were employed; Levin, Lin and Chu (2002) and I'm, Pesaran and Shin (2004).

Therefore, the unit root tests can be formulated as follows:

$$\Delta Y_{it} = \alpha Y_{it-1} + \sum_{j=i}^{pi} \beta_{ij} \Delta Y_{it-j} + D_{it}^{'} \sigma_i + \varepsilon_{it} \quad \text{i =1,…N: t =1,…T}$$

LLC tests the hypothesis of α=0, the null hypothesis states that each time series in the panel is non stationary, whilst IPS tests α=0 in each country for stationary time series. In addition, the IPS test form a simple average of the individuals to test α=0 by using T-bar statistics. The null hypothesis states that each series in the panel contain a unit root while the alternative hypothesis allows for some not all individuals to be non-stationary. The t- value can be computed as follows:

$$Z_t bar = {}^{1}\!/_{N} \sum_{i=1}^{N} Z_{It}$$

Therefore, the null hypothesis of t-statistics is that there is a unit root problem between the variables.

3.2.3 Panel Co-integration

After checking the stationarity of data and confirming that each series is integrated of the same order, the next step is to check whether these series can be combined together into a single series, which itself must be non-stationary, that is known as cointegration. Cointegrated series move in the same direction in long run and are in equilibrium relationship-integration tests have been developed by Granger in 1981 and extended by Engle and Granger in 1987. To overcome the problem, scholars introduce panel co-integration which pool both time series and cross sectional data in order to analyze the relationship between the variables which are non-stationary I (1). This study employed the Padroni panel co-integration test (1999). This test is the extension of Engle-Granger (1987) in the context of panel data. It is employed to examine the impact of trade openness and economic growth. Padroni introduced seven co-integration tests which are categorized into two dimensions which are: within dimension based statistics, referred to as co-integration statistics containing four test panels: v-statistics, panel p-statistics, panel t- statistics (non -parametric) and panel t-statistics (parametric). The other is between- dimension based statistics, which are referred to as group mean panel co-integration statistics. The tests are divided into three: group p- statistics, group t-statistics (non -parametric) and group t-statistics (parametric). The test is defined as follows:

1. Panel v statistic:

$$Z_V \equiv \left(\sum_{i=1}^{N} \sum_{t=1}^{T} \hat{L}_{11i}^{-2} \hat{e}_{i,t-1}^{2} \right)^{-1}$$

2.the panel t statistic:

$$Z_P \equiv \left(\sum_{i=1}^{N} \sum_{t=1}^{T} \hat{L}_{11i}^{-2} \hat{e}_{i,t-1}^{2} \right)^{-1} \sum_{i=1}^{N} \sum_{t=1}^{T} \hat{L}_{11i}^{-2} \left(\hat{e}_{i,t-1} \Delta \hat{e}_{i,t} - \hat{\lambda}_i \right)$$

3. the panel t statistic (Non-parametric):

$$Z_t \equiv \left(\tilde{\sigma}_{N,T}^{2} \sum_{i=1}^{N} \sum_{t=1}^{T} \hat{L}_{11i}^{-2} \hat{e}_{i,t-1}^{2} \right)^{-1/2} \sum_{i=1}^{N} \sum_{t=1}^{T} \hat{L}_{11i}^{-2} \left(\hat{e}_{i,t-1} \Delta \hat{e}_{i,t} - \hat{\lambda}_i \right)$$

4. The panel t statistic (parametric):

$$Z_t^{*} \equiv \left(\tilde{S}_{N,T}^{*2} \sum_{i=1}^{N} \sum_{t=1}^{T} \hat{L}_{11i}^{-2} \hat{e}_{i,t-1}^{*2} \right)^{-1/2} \sum_{i=1}^{N} \sum_{t=1}^{T} \hat{L}_{11i}^{-2} \left(\hat{e}_{i,t-1}^{*} \Delta \hat{e}_{i,t}^{*} \right)$$

5. The group t statistic (parametric):

$$\tilde{Z}_p \equiv TN^{-1/2} \sum_{i=1}^{N} \left(\sum_{t=1}^{T} \hat{e}_{i,t-1}^{2} \right)^{-1} \sum_{t=1}^{T} \left(\hat{e}_{i,t-1} \Delta \hat{e}_{i,t} - \hat{\lambda}_i \right)$$

6. The group t statistic (non-parametric):

$$\tilde{Z}_t \equiv N^{-1/2} \sum_{i=1}^{N} \left(\hat{\sigma}_i^{2} \sum_{t=1}^{T} \hat{e}_{i,t-1}^{2} \right)^{-1/2} \sum_{t=1}^{T} \left(\hat{e}_{i,t-1} \Delta \hat{e}_{i,t} - \hat{\lambda}_i \right)$$

7. The group t statistic (parametric):

$$\tilde{Z}_t^{*} \equiv N^{-1/2} \sum_{i=1}^{N} \left(\sum_{t=1}^{T} \hat{S}_i^{*2} \hat{e}_{i,t-1}^{*2} \right)^{-1/2} \sum_{t=1}^{T} \left(\hat{e}_{i,t-1}^{*} \Delta \hat{e}_{i,t}^{*} \right)$$

Where $\hat{\lambda}_i$ is a consistent estimator of the long run variance?

$$\hat{L}_{11}^2 = \frac{1}{T}\sum_{t-1}^{T}\hat{\eta}_{i,t}^2 + \frac{2}{T}\sum_{s=1}^{ki}\left[1-\frac{S}{K_I+1}\right]\sum\hat{\eta}_{i,t}\hat{\eta}_{i,t-s}, \hat{\sigma}_i^2 = S_i + 2\hat{\lambda}_i, \hat{S}_i = \frac{1}{T}\sum_{t=1}^{T}\eta_{it,}\sigma_{N,T}^2 = \frac{1}{N}\sum_{t=1}^{N}\hat{L}_{11}^{-2}\hat{\sigma}_i^2$$

$$\hat{S}_i^{*2} = \frac{1}{t}\sum_{t=1}^{T}\hat{\eta}_{i,t}^{-2}\tilde{s}_{N,T}^{*2} = \frac{1}{N}\sum_{i=1}^{N}\hat{s}_i^{*2},$$

And the residuals $\hat{\eta}_{i,t}$, $\hat{\eta}_{i,t}^*$ and $\hat{\eta}_{1,t}$ are obtained from the following regression:

$$\hat{e}_{i,t} = \hat{\gamma}_i\hat{e}_{i,t-1} + \eta_{i,t}\ , \ \hat{e}_{i,t}^* \hat{\gamma}_i e_{i,t-1} + \sum_{k=1}^{ki}\hat{\gamma}_{i,k}\Delta\hat{e}_{i,t-k} + \hat{\eta}_{i,t}^*\ , \Delta\gamma_{i,t} = \sum_{M-1}^{N}\hat{b}_{mi}\Delta x_{mi,t} + \hat{\eta}_{i,t}$$

Therefore, the null hypothesis of no co-integration is said to take place when residuals are non-stationary. On the other hand, when the residuals are stationary, there is co-integration. Given there is panel co-integration between the results, the long run relationship can further be estimated using panel co-integration estimation namely Ordinary Least Square, Fully modified OLS (FMOLS) estimator. It was developed by Phillips and Moon and Padroni in 1999, 1995, and 2000 respectively and Dynamic OLS (DOLS) developed by Kao and Chiang 2000. Unfortunately, Kao (1999) found that the OLS estimator is biased in analyzing non-stationary data. Fully modified OLS was then developed to correct the serial correlation and endogeneity of the OLS estimator. The test was developed by Philips and Hansen (1990), and extended to the context of heterogeneous panels by Pedroni (1997).

3.2.4 Dynamic Ordinary Least Square (DOLS)

When long run relationship among the variables is found then for the estimation of long run effects of openness on economic growth, the method employed to make the estimation is the Dynamic Ordinary Least Square (DOLS) which is dynamic ordinary least square (DOLS), which has been introduced by Saikkonen (1991) and Stock and Watson (1993) and extended to panel analysis by Kao and Chiang (1997). This method favored compared to Static OLS and Johansen and Juselius approach due to the following reasons. Firstly, it is more robust and appropriate for small sample size which implies more efficient and unbiased estimates (Singh, 2010; Majeed, 2007; Masih and Masih, 1996). Moreover, DOLS was subsequently proven to be more powerful than FMOLS or other estimation methods. It is advantageous in estimating both homogenous and heterogeneous data. This means that it uses both within and between dimension approaches. Between dimensions estimation provides results for a specific country which are interpreted as the mean value of the co-integration vector which requires the use of the pool mean group to estimate the average. The property of the pool mean group is that it should contain a larger cross section and time period. The within dimension measure gives results which are the same in each country. Therefore, the study used the within dimension estimation since the data does not require averaging.

The DOLS model can be formulated as follows;

$$LGDP_{it} = \alpha + \beta_1 LK_{it} + \beta_2 LSCH_{it} + \beta_3 TRD_{it} + \beta_4 LFDI_{it} + \sum_{j=-q}^{p}\varphi_{ij}\Delta K_{it-j} + \sum_{i=-q}^{p}\partial_{ij}\ \Delta SCH_{it} + \sum_{j=-q}^{p}\Phi\Delta TRD_{it} + \sum_{j=-q}^{p}\partial\ FDI_{it} + \varepsilon_{it}$$

Where p and q are the number of lags and leads respectively. The use of lag and lead is to capture serial correlation and endogeneity of the regresses that could result in unbiased estimation. With DOLS, even if the variables are co-integrated and have the problem of endogeneity, the results obtained would still be unbiased. Moreover, the approach does not need the use of instrumental variables nor exogeneity assumptions and would still give robust results when variables which are not co-integrated are omitted.

3.2.5 Granger Causality

Finally, once a co-integration relationship exists between two series, there is at least a causal effect the variables. Next step is to apply the Granger causality test. The granger causality (Granger 1988) test was performed only on co-integrated variables to examine causal relationship. The Granger method (Granger, 1988) seeks to determine how much of a variable, Y, can be explained by past values of Y and whether adding lagged values of another variable, X, can improve the explanation. Once the panel co-integrating test is completed, this study is

likely to undertake the granger causality test to test the casual direction between trade openness, labour, capital formation and FDI in EAC countries.

4. Empirical Results

Table 1: Panel unit root results (level)

Variables	Constant			
	IPS test		LLC test	
	Statistics	P-value	Statistics	P-value
LGDP	-2.6859	0.9964	1.277	0.8992
LFDI	-0.04018	0.484	0.47848	0.6838
FLK	0.57162	0.7162	-0.11193	0.4554
LSCH	3.02186	0.9987	0.78877	0.7849
LTRD	-1.19210	0.1166	-0.75256	0.2259

Source: Author's computation

Table 1 and 2 show the results for unit root test (IPS and LLC test). The results indicate that cannot reject the null hypothesis of unit root at level. However, after taking first difference are able to reject the null hypothesis of unit root. Therefore, the results strongly indicate that all the variables are stationary at first difference I (1).

Table 02: Panel unit root results (First difference)

Variables	Constant			
	IPS test		LLC test	
	Statistics	P-value	Statistics	P-value
D(LGDP)	-6.0248	0.0000	-5.31056	0.0000
D(LFDI)	-7.24575	0.0000	-5.0004	0.0000
D(LK)	-11.8785	0.0000	-13.785	0.0000
D(SCH)	-7.75549	0.0000	-7.26986	0.0000
D(LTRD)	-6.35738	0.0000	-6.45104	0.0000

Source: *Author's computation*
Note: significance at 5%

The use of panel cointegration techniques to test for the presence of long run relationships among integrated variables with both a time series dimension, T, and a cross section dimension, N, has received much attention in the literature. One of the most important reasons for this attention is the increased power that may be gained by accounting not only for the time-series dimension but also for the cross-sectional dimension. In spite of this many studies fail to reject the no cointegration null when cointegration is strongly suggested by theory. After detecting that all series are I(1), this study applied Padreni co-integration to test the existence of long-run relationship among the non-stationary variables. Table 4.3 presents the results for the co-integration tests.

Table. 3: Padreni Panel cointegration results

Panel cointegration test
Dependent Variable = LGDP
Independent Variables = LFDI LK LSCH LTRD

Statistic	Constant	Constant with trend
Panel v-Statistic	0.731862	0.434723
	(0.2321)	(0.2945)
Panel rho-Statistic	-0.226134	0.661165
	(0.4105)	(0.7457)
Panel PP-Statistic	-1.708108	-1.360286
	(0.0438)**	(0.0869)*
Panel ADF-Statistic	-1.617265	-0.090227
	(0.0529)*	(0.4641)
Group rho-Statistic	0.224917	1.263250
	(0.5890)	(0.8968)
Group PP-Statistic	-2.183199	-1.695304
	(0.0145)**	(0.0450)**
Group ADF-Statistic	-2.091125	-0.781388
	(0.0183)**	(0.2173)

Note: * and** represent statistical significance at 10% and 5% respectively.
Source**:** Author computation

Constant and constant with trend employs four panel statistics and three group statistics to test the null

hypothesis of no cointegration against the alternative hypothesis of cointegration. In the case of the panel statistics, the first order autoregressive term is assumed to be the same across countries, while in the case of group panel statistics the parameter is allowed to vary across countries.

Table 3 shows the panel cointegration test both the within and group statistics for cointegration between the variables, The results rejects the null hypothesis of no cointegration in Panel PP-Statistic, Panel ADF statistic, Group PP statistic, Group ADF statistic, Panel PP statistic and Group Statistic at both 5 and 10 percent level of significance. Since there is significance in most of group and statistic panel, it is convincing enough to say that variables in growth model are cointegreted with each other.

Table 4 presents the results of trade openness and economic growth model for the EAC countries based on DOLS estimator. The estimation requires the inclusion of leads and lags in order to avoid the autocorrelation problem and to capture the endogeneity of the independent variables. Therefore, the estimation used set of the lags and leads, by using one year lags and one year lead DOLS (1, 1) in order to get the robust results. The estimated result shows that there is a negative relationship between trade openness and economic growth for the EAC countries but statistical significant at 5%. This implies that trade openness contribute negatively to economic growth of these countries. This results is consistent with the findings of (Jang, 2000; Aka, 2006, Suleiman at el). In effect this results concerning show that the relationships between openness and growth do not support the new growth theory where increasing openness affects the long-run growth of the economy through its effects on technological change.

The results concerning the impact of trade openness on EAC member countries economic growth contrast with previous studies as they suggested that trade openness has positive impact on economic growth (Sakyi at el, 2012; Königer and Busse, 2012; Nowbutsing, 2014) and the forecasts of the World Trade Organization (WTO) about the expected benefits about increasing the dynamism of economic growth. These results could bed ue to the small quantity of exportation compared with importation of goods and most of these countries focused on export primary products rather than manufactured goods.

Furthermore, the result also shows that stock capital and economic growth are statistical significant at 5% and positively related. This reveals that an increase in capital stock will increase the economic performance of the region. This finding is supported by a study by Matthew and Adegboye (2014) which highlighted that economic growth will increase if there is an increase in the capital stock. In addition, the result revealed that foreign direct investment (FDI) and economic growth are statistical significant at 5% and positive relationship. This implies that FDI is the important factor that stimulates the economic growth in most of the developing countries. This result is consistent with Suleiman et al., (2013) who attested that FDI can play a greater role in enhancing economic growth. Meanwhile, labour force has a positive and statistical significant relationship with economic growth. This result is consistent with Suleiman et al., (2013) who indicated that labour force and economic growth.

Table. 4: DOLS estimates of the long run effect of Trade openness on economic growth for EAC Countries

Variable	Coefficient	t-Statistic	Prob.
LFDI	0.162519	5.074398	0.0000*
LK	0.203126	2.464131	0.0186*
LSCH	0.311629	5.365652	0.0000*
LTRD	-0.573514	-5.711326	0.0000*

Note: * reject the null of no cointegration at 5% level respectively.
Source: Author computation

Based on the co-integration results, it can be ascertained that variables are co-integrated, and therefore, are causally related. The Granger causality method is used to test the direction of causality among the variables. Table 5 below shows the results of granger causality, which there is existence a unidirectional causality relationship between trade openness and economic growth, this result supports the hypothesis that trade openness increases economic growth, as is suggested by the endogenous growth theory. Further, the increase in trade openness indicates important foreign trade is for the country and informs about the country's dependence on foreign markets, increases growth in the EAC countries.

Table. 5: Granger causality Test

Null Hypothesis:	Obs	F-Statistic	Prob.
LFDI does not Granger Cause LGDP	96	0.42676	0.6539
LGDP does not Granger Cause LFDI		5.81912	0.0042**
LK does not Granger Cause LGDP	96	3.89974	0.0237**
LGDP does not Granger Cause LK		5.02728	0.0085**
LSCH does not Granger Cause LGDP	96	1.25996	0.2886
LGDP does not Granger Cause LSCH		2.35211	0.1009*
*			
LTO does not Granger Cause LGDP	96	2.41456	0.0951*
LGDP does not Granger Cause LTO		1.16133	0.3177

Note: * and** represent statistical significance at 10% and 5% respectively.
Source: Author computation

Similarly, the results show that there is unidirectional between economic growth and foreign direct investment whereby only the increase of economic growth causes the FDI growth. Meanwhile, the result shows that there is bidirectional causality between capital stock and economic growth. This results support the neoclassical growth model. However, the result shows the causality between labour and economic growth at 10% significant level in EAC countries during the period of study.

5. Conclusion

This study examined the impact of trade openness on economic growth. In order to contribute to existing knowledge, this study used a sample of four (4) EAC countries for the period 1990-2015 to evaluate the relationship of trade openness on economic growth in EAC. There is statistical significance and granger cause economic growth of the EAC countries. The implication of this is that international trade can be positively beneficial to a country especially if the country is an exporter of goods and services rather than being just an importer of goods and services. However, results show negative impact of trade openness on the economic growth in the selected EAC countries. For these EAC countries to harness maximum gains from international trade, there has to be enabling conducive business environment which facilitate trade in the region. Therefore, there is a need for the governments of EAC countries, especially the sampled countries to wake up from their stagnation and pursue the growth of their economies strongly so that they can compete with the developed countries.

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